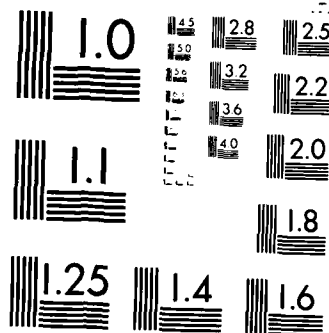MICROCOPY RESOLUTION TEST CHART

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TASC GRAPHICS SOFTWARE PACKAGE
REFERENCE MANUAL

Michael R. Tang

The Analytic Sciences Corporation
One Jacob Way
Reading, Massachusetts 01867

Final Report
14 May 1980 – 31 December 1982

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AIR FORCE GEOPHYSICS LABORATORY
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UNITED STATES AIR FORCE
HANSCOM AFB, MASSACHUSETTS 01731

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CONTRACTOR REPORTS

This technical report has been reviewed and is approved for publication.

THEODORE E. WIRTANEN
Contract Manager

THOMAS P. ROONEY
Chief, Geodesy & Gravity Branch

FOR THE COMMANDER

DONALD H. ECKHARDT
Director
Earth Sciences Division

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The interactive TASC Graphics Software Package (TGSP), developed at TASC, is based on NCAR Graphics Software. The basic NCAR Graphics Software has been extensively modified to allow for interactive color graphics. Many enhancements have also been made to meet the needs of the Weapons Support System (WSS). This document contains a general description of all the modifications and enhancements which are contained in the TGSP.

TGSP is used extensively in the applications software generated for the Weapon Support System.

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1.   GENERAL

The interactive TASC Graphics Software Package (TGSP),
developed at TASC, is based on NCAR Graphics Software (see
Ref. 1). The basic NCAR Graphics Software has been extensively
modified to allow for interactive color graphics. Many enhance-
ments have also been made to meet the needs of the Weapons
Support System (WSS). The following document contains a gen-
eral description of all of the modifications and enhancements
which are contained in the TGSP.

TGSP is used extensively in the applications software
generated for the Weapon Support System (Ref. 2-5).

2.   TGSP MODIFICATIONS

        Two major areas of extensions were made to the NCAR
Graphics Software in developing TGSP. First, extensions were
made to make the TGSP interactive. Second, extensions were
made to allow TGSP to use color graphics.

2.1   INTERACTIVE TGSP

        NCAR was designed to be a general plot package for
use with many different plotting devices. It is designed to
accept high level commands and generate an intermediate set of
commands called metacode and to then use device specific rou-
tines to convert metacode to device dependent instructions to
form a plot. The metacode translator was originally designed
by NCAR to run in a "batch" type environment. Extensive modi-
fications and enhancements were made to all of the metacode
translation routines to make TGSP interactive. As a result,
the driving routine was changed from MCTRN to WRITEB. The
program WRITEB was also modified to call the routine MCTRN
when the internal buffer was full.

2.2   TGSP ENHANCEMENTS

        Enhancements were incorporated in the TGSP for the
following reasons:

        •   Enable multi-color plots

- Increase capabilities of the basic plot package

- Decrease execution time.

The next sections will explain the high-level portions of the modified software.

2.2.1 Multi-Color Functions

Several subroutines were written to aid the user with the color interface to the TGSP. The following is a list of these subroutines and a brief description of their use:

Subroutine CURS

Sets up a crosshair cursor pattern for the Lexidata.

Subroutine LEXCLR (ILEV)

This program changes the current color level being written to by the plot package

ILEV = Color level to be written to

Subroutine LXBLCK

This subroutine sets the color-look-up table values to zero

Subroutine LXCOLR (ILEV, ICOLOR)

This subroutine will change the Lexidata color look-up table for a given level

ILEV < 0 - change current level
      = 0 - background / 0, 0, 0
      = 1 - default   /15, 0, 0   red
      = 2 - default   / 0, 15, 0   green
      = 3 - default   / 0, 10, 10 blue
ICOLOR = Three element array which contains values (0-15) for red, green, blue respectively

Subroutine LXDEFT

       This subroutine restores all three color levels to their
       original default values

Subroutine LXLEV (ILEV)

       This subroutine changes the Lexidata color level
           ILEV = Level to be written to

Subroutine TASC_AXIS (XS,YS,XE,YE,NTIC,NLAB,SVAL,STVAL,ISIDE,IAXIS)

       Draws X, Y, and Z axes on surface plots
        XS   = X - axis minimum in Lexidata units
        YS   = Y - axis minimum in Lexidata units
        XE   = X - axis maximum in Lexidata units
        YE   = Y - axis maximum in Lexidata units
        NTIC   = Number of tics along axis
        NLAB   = Number of labeled tic marks
        SVAL   = Minimum axis value in user units
        STVAL = Maximum axis value in user units
        ISIDE = Viewing elevation flag
        IAXIS = Flag to determine axis to be drawn
                = 1 X - axis is drawn
                = 2 Y - axis is drawn
                = 3 Z - axis is drawn

Subroutine TASC_ROTATE (X,Y,A)

       Performs an in-place transformation of point (X,Y)
       thru angle A
        X = X coordinate
        Y = Y coordinate
        A = Rotation angle (radians)

   2.2.2 Added Capabilities

Subroutine CONREC

      The ability to add headers and label axes has been
added to the contour plots. The following common blocks
control these functions:

```
COMMON BLOCKS;
        /CRLABS/ HEADER,XTITLE,YTITLE
        /CRMXMX/ XMIN,XMAX,YMIN,YMAX,NDEC
        /CRTICS/ NXMAJ,NXMINOR,NYMAJ,NYMINOR

COMMON ARGUMENTS;

        HEADER,XTITLE,YTITLE
          These arguments contain plot header, X-axis, and
          Y-axis information (Character * 40)

        XMIN,XMAX,YMIN,YMAX
          These arguments contain the X and Y minimum and
          maximum axis values.

        NDEC
          This argument defines the minimum number of decimal
          places to be displayed on the X and Y axis

        NXMAJ,NYMAJ
          These arguments define the number of major labeled
          tick marks along the X and Y axes.

        NXMINOR,NYMINOR
          These arguments define the number of minor unlabeled
          tick marks along the X and Y axes.
```

Subroutine SRFACE:

The ability to add headers and label axes has been added to the surface plots. The following common blocks control these functions:

```
COMMON BLOCKS;
        /SRLABS/ XTITLE,YTITLE,ZTITLE
        /SRMXMX/ XMIN,XMAX,YMIN,YMAX,NDEC

COMMON ARGUMENTS;
        XTITLE,YTITLE,ZTITLE
          These arguments contain X, Y and Z-axis
          information (Character * 40)

        XMIN,XMAX,YMIN,YMAX
          These arguments contain the X and Y minimum and
          maximum axis values.
```

NDEC
    This argument defines the minimum number of decimal
    places to be displayed on the X and Y axis.

ADDITIONAL AUTOGRAPH COMPATIBLE ROUTINES

    This section is divided into two parts. Part 1 contains a list of the routines in TGSP which enhance related routines in the AUTOGRAPH package along with a short description of each. Part 2 contains descriptions of the arguments of these routines. See the AUTOGRAPH writeup for a set of sample programs using the package and the output produced by each of the programs.

    Each of the following routines draws a complete graph allowing different colors for each curve with one call. Each is implemented by a set of calls to the lower level AUTOGRAPH routines AGSTUP, AGCURV, and AGBACK.

Part 1

        TGY(YDRA,NPTS,GLAB,ILEV)
          Draws a graph of the curve defined by the data
          points ((I,YDRA(I)),I=1,NPTS) with a graph label
          specified by GLAB.

        TGXY(XDRA,YDRA,NPTS,GLAB,ILEV)
          Draws a graph of the curve defined by the data
          points ((XDRA(I),YDRA(I)),I=1,NPTS) with a graph
          label specified by GLAB.

        TGMY(YDRA,IDXY,MANY,NPTS,GLAB,ILEV)
          Draws a graph of the family of curves defined by
          data points (((I,YDRA(I,J)),I=1,NPTS),J=1,MANY)
          with a graph label specified by GLAB. The order of
          the subscripts of YDRA may be reversed (see the
          routine DISPLA, argument LROW).

        TGMXY(XDRA,YDRA,IDXY,MANY,NPTS,GLAB,ILEV)
          Draws a graph of the family of curves defined by the
          data points (((XDRA(I),YDRA(I,J)),I=1,NPTS),J=1,MANY)

with a graph label specified by GLAB. XDRA may be
doubly-subscripted and the order of the subscripts
of XDRA and YDRA may be reversed.

Part 2

This part contains descriptions of the arguments to
the routines: TGY,TGXY,TGMY,TGMXY.   In calls to the
routines TGY,TGXY,TGMY and TGMXY

XDRA
  An array of x-coordinates, dimensioned as implied
  by the current value of the AUTOGRAPH control pa-
  rameter ROW. The value of the AUTOGRAPH parameter
  NULL/1.--1.E36 by default--when used as an x-
  coordinate, implies a missing data point. The
  curve segments on either side of such a point are
  not drawn.

YDRA
  An array of y-coordinates, dimensioned as implied
  by the current value of the AUTOGRAPH control pa-
  rameter ROW. The value of the AUTOGRAPH parameter
  NULL/1.--1.E36 by default--when used as a y-
  coordinate, implies a missing data point. The
  curve segments on either side of such a point are
  not drawn.

IDXY
  The first dimension of the arrays XDRA (if it has
  two dimensions) and YDRA.

MANY
  The number of curves to be drawn by the call to
  TG... Normally, the second dimension of XDRA
  (if it has two dimensions) and YDRA.

NPTS
  The number of points defining each curve to be
  drawn by the routine TG... Normally, the first
  (or only) dimension of XDRA and YDRA.

GLAB
  A character string (or an array containing a char-
  acter string) defining a label to be placed at the
  top of the graph. The string may not be more than
  40 characters. If it is fewer than 40 characters,
  the last character must be $. (The $ is stripped
  off when the label is printed.) A zero may be used
  in place of the argument GLAB, indicating that the
  previous label should continue to be used. (The

initial label consists of blanks.) Note that the
use of a zeroed GLAB is non-standard. The routines
AGSETP, AGSETF, and AGSETI may be used to define
labels in a more nearly standard manner.

ILEV
An integer array, dimensioned MANY, each element
being an integer from 0 to 3 representing the color
to draw a curve. The value ILEV(1) determines the
color of the first curve, and ILEV(MANY) deter-
mines the level of the last curve. Note:
   0 is the background, usually black
   1 is usually red
   2 is usually green
   3 is usually blue.

3.   USER INTERFACE

When the user wishes to use to TGSP the following
link is required:

LINKINTER program_name, user_library

When the user wishes to use the LINKINTER command file the
following sequence is required:

$LINKINTER program_name, user_library

At the end of each frame plotted the user is offered
the following options:

- <cr>/Clear - TO CLEAR SCREEN AND CONTINUE

- COlor - TO CHANGE COLORS

- Overlay - TO CONTINUE WITHOUT ERASING SCREEN

- Print - TO PRODUCE HARD COPY

- Zoom - TO ZOOM AND SCROLL

- Quit - TO TERMINATE THE PROGRAM.

The routine [TGSP.INTER]LXPRMT.FOR is responsible for the
prompting sequence seen by the user at the end of each frame
plotted. If the user wishes to modify this routine the follow-
ing command sequence should be used once changes are made to
LXPRMT.FOR:

$FOR LXPRMT

$LINKINTER main_name,LXPRMT,any_userlib/lib

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4. <u>SUMMARY</u>

The TASC GRAPHICS SOFTWARE PACKAGE was developed from the NCAR plot package. Enhancements were made to add color capability, to make the package interactive, and to provide axes on surface plots. Attached are updates to the NCAR documentation reflecting these capabilities.

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1. Henderson, L., and Clare, F., <u>NCAR Graphics Software</u>,
    National Center for Atmospheric Research, Boulder,
    Colorado, 1979.

2. Capp, D.W., "The Weapons Support System Gravity Evalua-
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4. Ayres, C.L., Goldstein, J.D., and Staudinger, J.R.,
    "The Weapons Support System Multisensor Simulation
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    Sciences Corporation, Technical Report No. TR-1946-5,
    October 1981.

UPDATES -- NCAR GRAPHICS SOFTWARE MANUAL

6/30/81

Version 1.3

TASC Updates

1.   Page 31a. Add the following description of new common
     areas:
          COMMON BLOCKS;
               /CRLABS/ HEADER, XTITLE, YTITLE
               /CRMXMX/ XMIN, XMAX, YMIN, YMAX, NDEC
               /CRTICS/ NXMAJ, NXMINOR, NYMAJ, NYMINOR

          COMMON ARGUMENTS;

               HEADER, XTITLE, YTITLE
                  *These arguments contain plot header, X-axis,
                  and Y-axis information (Character * 40)*

               XMIN, XMAX, YMIN, YMAX
                  *These arguments contain the X and Y minimum
                  and maximum axis values.*

               NDEC
                  *This argument defines the minimum number of
                  decimal places to be displayed on the X and
                  Y axis.*

               NXMAJ, NYMAJ
                  *These arguments define the number of major
                  labeled tick marks along the X and Y axes.*

               NXMINOR,NYMINOR
                  *These arguments define the number of minor
                  unlabeled tick marks along the X and Y axes.*

2.   Page 33. The following internal default values have been
     changed to:
               SIZEM   1.0
               SLT   0.09
               YBT   0.09
               SIDE   0.86

1

3.   Page 34.   The following internal default values have been changed to:
          IOFFM   1
          ISOLID   1023

4.   Page 134.   The default value of ISKIRT is set to 1.

5.   Page 134a.   Add the following description of new common areas:
          COMMON BLOCKS;
                /SRLABS/ XTITLE, YTITLE, ZTITLE
                /SRMXMX/ XMIN, XMAX, YMIN, YMAX, NDEC

          COMMON ARGUMENTS;
                XTITLE, YTITLE, ZTITLE
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                    and maximum axis values.

                NDEC
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                    decimal places to be displayed on the X and
                    Y axis.

6.   Page 243a.   Add the following subroutine description:

Subroutine CURS
      Sets up a crosshair cursor for the Lexidata.

Subroutine LEXCLR (ILEV)
      This program changes the current color level being
      written to by the plot package

          ILEV = Color level to be written to

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Subroutine LXCOLR (ILEV,ICOLOR)
      This subroutine will change the Lexidata color look-up
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                ILEV   = <0 - Change current level
                        = 0 - background / 0,0,0
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                        = 2 - default /0,15,0   green
                        = 3 - default /0,10,10   blue

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ICOLOR = Three element array which contains values
                             (0-15) for red, green, blue respectively

Subroutine LXDEFT
    This subroutine restores all three color levels to
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       YE   = Y - axis maximum in Lexidata units
       NTIC = Number of tics along axis
       NLAB = Number of labeled tick marks
       SVAL = Minimum axis value in user units
       STVAL = Maximum axis value in user units
       ISIDE = Viewing elevation flag
       IAXIS = Flag to determine axis to be drawn
                = 1 X - axis is drawn
                = 2 Y - axis is drawn
                = 3 Z - axis is drawn

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    Performs an in-place transformation of point (X,Y)
    through angle A
          X = X coordinate
          Y = Y coordinate
          A = Rotation angle in radians

END

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